Sun," and this was succeeded by a lecture on "Soaring Flight" by Dr. E. H. Hankin, and one by Mr. F. L. Usher on "Explosives." The only social function took place on the afternoon of January 11, when the members were received at the palace by H.H. the Maharajah of Mysore, to whose Government the Congress is indebted for the invitation to meet this year in Bangalore. On the following afternoon the members visited the laboratories of the Indian Institute of Science at the invitation of the director and staff.

At the concluding business meeting it was announced that the Congress would meet next year in Lahore, under the presidency of Dr. Gilbert Walker, F.R.S. F. L. U.

NOTES.

WE regret to learn from the *Times* that the death of Dr. E. von Behring, the discoverer of the curative effect of the serum of immunised animals in the treatment of diphtheria, is announced in the German newspapers.

THE annual general meeting of the Chemical Society was held at Burlington House on March 29, Dr. Alexander Scott being in the chair. Prof. W. J. Pope was elected president, Col. Smithells and Prof. Sydney Young were the two new vice-presidents elected, and Prof. H. C. H. Carpenter, Prof. A. Findlay, Prof. A. Harden, and Dr. T. A. Henry were elected as new ordinary members of council. Dr. Scott delivered his presidential address upon the subject of "The Atomic Theory."

A NEW branch of the Ministry of Munitions has been established under Sir Lionel Phillips as Controller, to deal with the examination and development of such mineral properties (other than coal or iron ore) in the United Kingdom as are considered likely to be of special value for the purposes of the war. The Minister of Munitions has appointed the following to act as an advisory committee on the development of mineral resources:—Sir Lionel Phillips, Bt. (chairman), Mr. F. J. Allan, Mr. C. W. Fielding, Mr. R. J. Frecheville, Prof. F. W. Harbord, Mr. F. Merricks, Sir Harry Ross Skinner, Dr. A. Strahan, and Mr. Edgar Taylor, together with a representative to be nominated by the Board of Trade.

WE learn from *Science* that Prof. A. V. Stubenrauch, professor of pomology in the University of California, died at Berkeley, Cal., on February 12. A graduate of the University of California of 1899, Prof. Stubenrauch was for ten years in the U.S. Department of Agriculture, resigning in 1914 his position as pomologist in charge of field investigations to return to service in the University of California. He was the first to demonstrate that dates could be grown with commercial success in the Imperial Valley, on the desert in southern California; and in association with Mr. G. H. Powell he developed the pre-cooling method, which has greatly contributed to success in the shipping of fruit from California.

A KINEMATOGRAPH film of great interest is now being shown at the Philharmonic Hall, Great Portland Street, by Capt. Campbell Besley. Capt. Besley, who is an Australian, undertook an expedition to the head waters of the Amazon at the request of the President of Peru in co-operation with Mr. Bryan, then Secretary of State of the United States of America. The chief objects of the expedition were to determine the source of the Amazon and to ascertain the fate of former explorers, who were supposed to have been killed by hostile Indians. The expedition, which was away two years, achieved its objects, but at considerable cost of life, for of the twelve white men who started only four returned. Several fell victims to the poisoned arrows of the natives. The pictures, which are explained by Capt. Besley, show the great rivers, the vegetation, and animal life of the region visited. They are an example of the great educational value of the kinematograph. The film is at present shown daily at 3 and 8 p.m.

THE seventieth annual meeting of the Palæontographical Society was held on March 30 in the Geological Society's rooms, Burlington House, Dr. Henry Woodward, president, in the chair. The report referred to the delay of the publications owing to existing circumstances, but noted that there was no diminution in the number of monographs offered. Instalments of the volumes on Pliocene Mollusca, Palæozoic Asterozoa, and Wealden and Purbeck fishes were about to be issued. Dr. Henry Woodward, Mr. R. S. Herries, and Dr. A. Smith Woodward were re-elected president, treasurer, and secretary respectively, and the new members of council were Mr. H. A. Allen, Mr. E. Heron-Allen, Rev. H. N. Hutchinson, and Mr. C. T. Trechmann. In a brief address the president mentioned that when the society was founded on March 23, 1847, it was estimated that the description and illustration of all the British fossils could be completed in twenty-five years. The long series of volumes published during seventy years, however, had proved to do little more than make a good beginning of the task.

ON Thursday, March 29, a representative assembly of the friends and admirers of the late Sir William Huggins, O.M., and Lady Huggins met together in the crypt of St. Paul's Cathedral to witness and participate in the unveiling and dedication of a medallion commemorating conjointly the achievements of a great astronomer and the inspiring efforts of a wife who, for some thirty-five years, identified herself with his aims and labours. Among those present were Sir Joseph Thomson, O.M., president of the Royal Society; Dr. A. Schuster and Mr. W. B. Hardy, secretaries R.S.; Sir Alfred Kempe, treasurer R.S.; Sir Archibald Geikie, O.M.; Major MacMahon, president of the Royal Astronomical Society; the Astronomer Royal; Sir W. Crookes, O.M.; Mr. H. F. Newall; Sir Joseph Larmor; Mr. E. B. Knobel; Sir W. Tilden; Mr. E. W. Maunder; Mr. W. H. Wesley; and the Rev. T. R. R. Stebbing. A number of ladies were also present. After the memorial had been unveiled a short form of service was conducted by Dean Inge, with whom were Canon Simpson and Canon Alexander. In committing the memorial to the charge of the Dean and Chapter, Sir Joseph Thomson paid eloquent tribute to the scientific achievements of Sir William Huggins. Born and educated in London, and all his work having been carried on and issued from a London observatory, St. Paul's appeared the fittest of destinations for a medallion. Major MacMahon, referring to certain points in a great life, said that Huggins saw celestial chemistry looming in front of him, and before many years had elapsed he was the pioneer of a new branch of science. The medallion of Sir William Huggins, it should be noted, was the primary object of the memorial, but, on the death of Lady Huggins, it was decided to place her portrait beneath that of her husband, on the same slab. Both are the work of Mr. Henry Pegram, A.R.A. The inscriptions run respectively: "William Huggins, Astronomer, 1824–1910"; "Margaret Lindsay Huggins, 1848–1915."

Second Lieut. Cyril Douglas McCourt, who lost his life while gallantly leading a bombing attack in France on October 8, 1916, was born in 1883, and educated at St. Charles's College, North Kensington, whence he gained an institute scholarship at the City and Guilds of London Central Technical College, now part of the Imperial College of Science and Technology. After gaining the college associateship in chemistry, he served for a brief period as private assistant to Prof. H. E. Armstrong. In 1903 he was appointed chief chemist to the Morgan Crucible Co., Ltd., and during the six years that he held that post he carried out a number of valuable investigations bearing upon the manufacture and uses of various refractory materials, but the outstanding feature of his work was the part he played in the invention and subsequent development of the Morganite brush for dynamos and motors. This brush possesses exceptionally good lubricating and commutating properties, which are principally due to the comparatively low temperature at which it is burnt during its process of manufacture. In 1909 Mr. McCourt resigned his appointment with the company in order to work out, in collaboration with Prof. W. A. Bone, in Leeds, the industrial applications of the phenomenon now known as "incandescent surface combustion," a field of technical research which strongly attracted him, and afforded him ample scope for turning to good account his considerable knowledge of refractory materials. This collaboration speedily resulted in the many important scientific inventions comprised under the "Bonecourt" surface combustion system, the value of which has been more appreciated in America and Germany, where already considerable developments have been successfully worked out, than in the country in which they originated. Mr. McCourt showed great versatility and ingenuity in all his experimental work, to which he was passionately devoted, whilst his frank and generous nature was highly valued by all with whom he came in contact. Shortly after the outbreak of war he abandoned his research work in order to join the Army, where he anticipated that his scientific training and experience of the management of men would stand his country in good stead. His death is a real loss to science.

Dr. J. W. Fewkes has reprinted from the Holmes anniversary volume an interesting monograph on the remarkable cliff-ruins in Fewkes Cañon, Mesa Verde National Park, Colorado. The author was deputed in 1915 by the Smithsonian Institution to continue the work of excavation and repair of these buildings. A report on the general results of the work was published under the title of "Excavation and Repair of the Sun Temple." In the course of the season's work he also excavated and repaired a cliff-dwelling, called Oaktree House, the results of which are described in the present publication. A plan of this building, which cannot be called characteristic, but resembles that of Spruce-tree House and other cliff-houses in Mesa Verde Park, is given. In another building, known as the Painted House, a series of representations of men and animals was discovered. The monograph is complete and well illustrated, and gives much information on the religious cults of the builders.

Dr. Maynie R. Curtis continues (*Biol. Bull.* xxxi., No. 3) previous interesting studies in the "Physiology of Reproduction in the Domestic Fowl" with a paper on double eggs. From the observations given it appears that an egg, after having received its membrane or its membrane and shell, may be propelled up the oviduct instead of being laid. In such case it may, on re-entering the terminal part of the duct, stimulate the secretion of another set of envelopes around those already formed, or, if it meets its successor, return along with it, and with it become enclosed in a common set of envelopes.

A useful vegetation map of the United States by Mr. F. Shreve, of the Arizona Desert Laboratory of the Carnegie Institution, is published in the *Geographical Review* for February (vol. iii., No. 2). The map, which is produced in colours, differs in some respects from previous maps, and shows eighteen vegetation areas. The basis of the classification is, as usual, desert, grassland, and forest. Of these the desert and the forest are subdivided, but the natural grassland in want of data has been left as a single region. The local influence of soil has been ignored so far as possible. The map forms a valuable basis for geographical work, and has the merit of steering a course between excessive detail valuable only to the botanist and wide generalisations which are a danger to geographical research.

A new method of expressing the representative fraction of a map is suggested by Mr. A. R. Hinks in a paper on British and metric measures in geographical work in the *Geographical Journal* for March (vol. xlix., No. 3). Mr. Hinks proposes to take the fraction of the "million" map, 1/M, as a unit and to write the representative fraction of all maps on a larger scale than 1/M as a fraction with M in the denominator and the proper numerator; thus 1/125,000 would be written 8/M, and 1/63,360 as 15·8/M. In maps on a smaller scale than 1/M the denominator would be expressed in M's; thus 1/1,680,000 would be written 1/1·68M. Mr. Hinks proposes that this system should be given a trial by adding it as an alternative to the ordinary form. It is certainly less inconvenient and easier to write than the large number of figures required in the usual representative fraction.

The first part of vol. xvi. of the Transactions of the Geological Society of Glasgow (1916, price 7*s.* 6*d.*) contains a presidential address by Prof. J. W. Gregory that deserves to be widely read, on "The Geological Factors Affecting the Strategy of the War and the Geology of the Potash Salts." The careful annexation of the Lorraine ironfield by Germany in 1871, and the equally far-sighted occupation of the best French coalfields since 1914, are judiciously pointed out. A summary of Everding's paper on the potash-salt area of Prussia includes sections not easily available. Other sources of potash are usefully reviewed, and to these alunite might now be added.

Now that the development of marine warfare has compelled every nation to look into its own resources, it is cheering to receive Mr. C. H. Clapp's report on the geology of the Nanaimo map-area (Mem. 51, Canada Geological Survey), in which a promising report is given of the Upper Cretaceous coals on Vancouver Island, directly opposite the terminus of the Canadian Pacific Railway. Though the ash is often about 9 per cent., the seams provide "high volatile bituminous coals of fair quality" and thicknesses of 5 ft. and 6 ft. are common. Admirably produced topographical and geological maps on the scale of 1 : 62,500 are provided with the memoir.

The importance of a suitable site for the installation of seismographs is illustrated in a recent number of the Georgetown (U.S.A.) University Publication. Two Wiechert seismographs were placed temporarily at the base of a tower 212 ft. in height, and the rocking of this tower by heavy winds affected the records of the instruments. These and other seismographs were then erected in a heat- and damp-proof cave excavated beneath the quadrangle. The Publication referred to contains the records of these instruments for the whole of the year 1916, and Press notices of earthquakes which occurred during the same year in various parts of the world. The influence of the war is shown by the fact that all but ten of these earthquakes were of American origin.

THE Department of Mines of the South Australian Government has recently issued its first metallurgical report. The author is Mr. J. D. Connor, the Government metallurgist, who has undertaken a visit to the United States of America with the view of studying the recovery of copper from its ores by leaching and precipitation. His object was to secure such information as might assist in rendering available for realisation the mineral assets of South Australia, and in particular the unworked oxidised copper ores of the northern mining fields. Too much stress cannot be laid on the absolute necessity for exhaustive experimentation before any attempt is made to deal with the problem of leaching copper ores on a large scale. The principle of insisting on properly controlled tests before a working plant is erected is applicable to almost every metallurgical proposition. Mr. Connor's visit was not so successful in its outcome as he had anticipated. Although he travelled more than 10,000 miles, he saw only two leaching plants in actual operation, one of a capacity of 2000 tons a day, and the other an experimental plant of 40 tons per day. He did not visit the great plant at Chuquicamata, in Chile, where 10,000 tons of ore are leached per day. His general conclusion is that the leaching of copper ores is not being carried out in the United States to anything like the extent that might have been anticipated considering the amount of literature on the subject. A great deal of experimental work has been done in the past by very able operators backed by large organisations. To a considerably less extent this work is going on now, but it has been completely put into the background by the recognition of the possibilities of the "flotation" process (see NATURE, March 22). That American metallurgists should have been so long in taking up this process is certainly surprising, but now that they have done so, and particularly after litigation difficulties have been removed, it is likely that great developments will take place. As yet oxidised ores are not susceptible to treatment by flotation processes.

IN view of the movement for the establishment in France of a number of national laboratories at which the scientific problems which arise in the industries may be investigated, *La Nature* has commenced the publication of a series of articles dealing with the laboratories which have been founded in other countries for the same purpose. On account of the prominent position the National Physical Laboratory at Teddington has made for itself in the short time it has been in existence, it has been chosen as the first of the series, and in the issue of *La Nature* for March 10 a well-illustrated article giving an account of the foundation, method of management, and equipment of the laboratory appears.

THE *British Journal Photographic Almanac* for this year has at length appeared. Present circumstances have not only delayed its issue, but reduced its size to little more than the half of what it used to be; still, it is a bulky volume of 780 pages. The maximum number of pages allowed to any one advertiser having been very much reduced, some manufacturers' announcements are a great deal more condensed than heretofore, but the advertisement pages remain a very good guide to the various branches of the trade. The "Epitome of Progress" is curtailed chiefly with regard to kinematography, the literature of which published during the last year is very voluminous. The new British-made developers are included in the tables of formulæ. The section referring to sensitisers and dyes for colour-filters remains very much as before. The editor's article treats in a lucid manner with the elementary principles of chemistry so far as concerns the practice of photography, and this, therefore, is an appropriate time to point out a chemical error that is of many years' standing. The lengthy and useful table of chemical names, symbols, and atomic weights of numerous compounds has the atomic (or molecular) weights given described as "equivalent weights," which, of course, they are not.

THE *Biochemical Journal* for December, 1916, contains an important paper by Mr. H. Ackroyd and Prof. F. G. Hopkins, entitled "Feeding Experiments with Deficiencies in the Amino-acid Supply: Arginine and Histidine as Possible Precursors of Purines." In the authors' experiments young growing rats were fed first on a diet composed of acid-hydrolysed caseinogen, potato-starch, cane-sugar, lard, butter, and ash from equal weights of oats and dog-biscuit, then on the same diet from which the arginine and histidine had been removed, and finally on this second diet plus arginine or histidine, or both. The necessary vitamine supply was given in the form of a protein-free alcoholic extract of fresh-milk solids. In other experiments the tryptophane or the vitamine was absent from the diet. The results show that when both arginine and histidine are removed from the diet there is a rapid loss of body-weight of the rats, and a renewed growth when the missing diamino-acids are restored. Nutritional equilibrium is possible in the absence of one of these protein constituents, but not in the absence of both. The suggestion is made that this is because each of the two diamino-acids can, in metabolism, be converted into the other. If both arginine and histidine are removed from the food, the amount of allantoin excreted is much diminished, but the decrease is very much less when only one diamino-acid is removed When both are replaced, the excretion returns to the normal. When tryptophane or vitamine is removed from the food there is no decrease in the amount of allantoin excreted, although nutritional failure is then greater than when arginine and histidine are withheld. It is accordingly suggested that these two diamino-acids play a special part in purine metabolism, probably constituting the raw material for the synthesis of the purine ring in the animal body.

THE registrar of the Institute of Chemistry is particularly well situated to appreciate the important part played by chemists in the war, since he has had control of the register of chemists available for Government and other services maintained by the Institute. This fact adds an enhanced interest to the article "Chemists in War" which he contributes to the Proceedings of the Institute for February. The general community is probably at last beginning to know that the *rôle* of the chemist in the manufacture of high explosives is all-important, but it is very doubtful whether it realises even yet that his help is necessary in the production of all metals, cloth, leather, india-rubber, glass, food, pure water, and medicine—in fact, of practically every article of everyday life. Many chemists have been appointed to commissions in the Royal Army Medical Corps, the Army Service Corps, and the Army Ordnance Corps, whilst in order to fight the German with his own weapon, a special force of chemists was enlisted for the preparation and employment of poisonous gas at the front in Flanders. The chemists employed in the

Army have received the recognition both of Lord French and of Sir Douglas Haig. A large number of chemists have been engaged to work in the laboratories and works of Government and controlled establishments making munitions of war. The chemical staffs of Woolwich Arsenal and of the Government Laboratory have been largely increased, whilst university and college laboratories have in many cases become small factories for the preparation of drugs, antiseptics, etc. Finally, and perhaps most important of all, the Government has accepted the guidance of our most able and experienced chemists in the investigation of such problems—become acute by reason of the war—as merit their special attention. At last the chemist seems to be coming into his heritage.

An interesting paper on the subject of sulphur in petroleum oils was read by Dr. F. M. Perkin at a recent meeting of the Institution of Petroleum Technologists. Nearly all naturally occurring petroleum oils contain sulphur, some having only a very small proportion, others large amounts. Oils obtained by the distillation of shales also contain sulphur, the proportion depending partly upon the quantity present in the material distilled, and partly upon the form in which the sulphur exists in that material. The paper illustrates the numerous forms in which sulphur may occur in the oils by reference to the homologous thiophenes, thiophanes, and alkyl sulphides; the probable origin of the sulphur in petroleum is also discussed. Be the origin what it may, as a constituent of petroleum oils sulphur is very objectionable. In petrol it gives rise to a disagreeable exhaust; in lamp-oils it causes an unpleasant odour, decreases the luminosity, and tarnishes domestic ornaments; in oil fuel it vitiates the atmosphere of the stokeholds and corrodes boiler-plates and tubes. Hence the question of desulphurising the oils is one of much importance. We have in the Kimmeridge shales a considerable source of shale oil, but, unfortunately, the sulphur content is very high. If a practicable method of removing the sulphur could be found, the Kimmeridge shale oil would be of immense value to this country. Many attempts have been made, but so far without success. Dr. Perkin describes various methods of desulphurising which have been employed or proposed, and also outlines a new process, which consists in the treatment of the oil at high temperatures with gaseous ammonia. In these circumstances sulphur is eliminated from the oil in the form of hydrogen sulphide. At present, however, the process is only in its initial stages, and not much information could be given as to its practical application.

The eighty-third annual report of the Royal Cornwall Polytechnic Society (vol. iii., part ii., 1916), just issued, is of more than local interest, because of the important scientific and industrial research papers included in it. A paper on "The Physical Condition of Cassiterite (Tin Ore) in Cornish Mill Products," by the late Mr. J. J. Beringer, contains a new theory to account for the loss of the tin mineral which present appliances fail to recover. It is explained by a thoughtful introduction by Mr. W. H. Trewartha-James, who collated and revised the author's notes just before he died. This paper attracted wide attention, and nearly all the mine managers in Cornwall were present at the society's meeting at Falmouth in 1915 to discuss the important conclusions. The discussion ultimately resulted in the decision of the Government Department of Scientific and Industrial Research to subsidise and establish a scheme of research in tin and tungsten minerals at the suggestion of the Institution of Mining and Metallurgy in cooperation with the Royal Cornwall Polytechnic Society. Other papers in the report are: "Tin and Tungsten Minerals in the West of England," by the late Mr. J. H. Collins; "The Prospects of Tin in the United States," by Mr. H. Foster Bain, presenting important facts with regard to the international position of the tin industry; "The Development of Mechanical Appliances in China Clay Works," by Mr. J. M. Coon; "Piskies," a Cornish folk-lore study, by the president, Mr. H. Jenner; and a lecture on the fly problem by Mr. F. Balfour Brown. The report can be obtained from the society, or from William Brendon and Sons, Ltd., printers, Plymouth, price 5s.

OUR ASTRONOMICAL COLUMN.

Comet 1917*a* (Mellish).—The discovery of a new comet by Mr. Mellish, on March 20, has been announced by Prof. Strömgren. It was observed at Copenhagen on March 22 in R.A. 2 h. 9 m., decl. 15° 1′ N., and was rated at mag. 7·5. The comet is situated in the constellation Aries, and is consequently only visible for a short time after sunset.

D'Arrest's Periodic Comet.—On the basis of corrected elements for this comet, which has a period of six and a half years and returns to perihelion this year, the following ephemeris has been given by J. Braae (*Ast. Nach.*, 4874):—

1917		R.A.			Decl.		Log r	Log Δ
		h.	m.	s.	°	′		
March	29	22	41	59	−6	25·3	0·1031	0·3101
April	2	22	56	29	5	34·9	0·1027	0·3092
	6	23	10	52	4	43 8	0·1030	0·3086
	10		25	8	3	52·1	0·1039	0·3084
	14		39	14	3	0·4	0·1054	0·3086
	18	23	53	11	2	8·9	0·1076	0·3088
	22	0	6	58	1	17·9	0·1103	0·3094
	26		20	34	−0	27·8	0·1136	0·3102
	30		33	57	+0	21·2	0·1175	0·3113
May	4	0	47	9	1	8·8	0·1218	0·3125
	8	1	0	9	+1	54·7	0·1266	0·3138

The date of perihelion passage is April 2. During the above period the comet will be about two hours west of the sun.

Bright Meteors in March.—Mr. Denning writes: On March 14 at 10 h. a meteor equal to Jupiter was observed at Totteridge and Stowmarket. It fell over the south-east coast from a height of 71 to 17 miles. On March 15 at 11 h. 30 m. a meteor as bright as Venus was observed by Miss G. Lewis from Droitwich, and by several other persons in various parts of the country. The records of its flight are not, however, in good agreement, though the radiant point was probably in the Lynx, and the position of the object nearly over Cheltenham at its disappearance. On March 19 at 7 h. 32 m., a fine meteor was seen through clouds at Bristol, as it sailed almost vertically down the northern sky. On March 27 at 10 h. 17 m. and 10 h. 43 m. a pair of brilliant meteors were seen by Mrs. Wilson at Totteridge, and by Miss T. E. Gall at Hornsey, N. They were directed from a radiant low in the east near μ Libræ, and pursued nearly horizontal flights at heights of about 54 miles, and velocity 15 miles per sec.

Photographs of Jupiter.—Photographs of the planet Jupiter showing a large amount of interesting detail were obtained during the recent apparition by Mr. J. H. Reynolds with a 28-in. reflector at his observatory near Birmingham (Journ. B.A.A., vol. xxvii., p. 151). The telescope was adapted as a Cassegrain with an equivalent focal length of 55 ft., and the image was further magnified from three to six times by a Barlow lens. At the opposition of 1916, the N. temperate belt, which was absent in 1915, reappeared with strength and size comparable with that